



Vaccine Hesitancy: A Literature Review

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By Sara Jaye Sanford, MPH
WithinReach & VaxNorthwest

This review prioritizes research on vaccine hesitancy among parents of young children (focusing on early childhood immunizations) in the US that was published between 2011 and mid-2016. It updates a previous review of literature published through 2014, and is not exhaustive.

What is vaccine hesitancy?

The World Health Organization defines vaccine hesitancy as “a behavior, influenced by a number of factors, including issues of confidence (do not trust vaccine or provider), complacency (do not perceive a need for a vaccine, do not value the vaccine), and convenience (access)... Vaccine hesitant individuals may accept all vaccines but remain concerned about vaccines, some may refuse or delay some vaccines, but accept others; some individuals may refuse all vaccines.”¹ The Vax Northwest partnership has defined it more succinctly as “reticence to immunize per the Centers for Disease Control and Prevention’s recommended schedule or to immunize at all.” For the purpose of this review, Vax Northwest’s definition will be followed, including parents with concerns about immunizations who immunize completely, partially, or not at all. While they are of critical importance to maintaining high levels of immunization, issues of vaccine access are beyond the scope of this review.

Who is vaccine-hesitant?

Immunization status: Vaccine hesitant parents are a diverse group who are defined by attitudes or beliefs questioning the value of immunization for their children – which does not translate directly into immunization behaviors.² Although vaccination status is of course a key outcome, some parents may vaccinate in a timely manner even if they have significant doubts about doing so.^{2,3} From a community or state-wide perspective, it is possible that supporting these parents with positive, accurate immunization may promote immunization as a positive social norm. From an intervention perspective, it may be difficult to know in advance which concerned parents may vaccinate regardless and which parents will decline or delay vaccines based on their concern. Nonetheless, parent attitudes about vaccines are certainly correlated with their children’s immunization status.^{4,5,6}

Identity as Hesitant: A qualitative study found that many parents who identified as “pro-vaccine” nonetheless chose to delay some of their children’s immunizations.⁷ Although they sought and valued evidence-based information, they found the quantity and presentation overwhelming and relied on “instincts” in making this decision, which they perceived as risk-free. Many of the parents interviewed were





sympathetic towards hesitant parents, and the authors concluded that the perception that delaying vaccination is risk-free helped to foster an environment in which delaying is seen as a social norm.

Prevalence: Although there is little consistent surveillance of vaccine hesitancy, research suggests that vaccine hesitancy is increasing,⁸ or put conversely, vaccine confidence is decreasing.³ In one survey, over 30% of parents reported each of the following concerns: pain their child may experience receiving shots; the number of shots given in one visit; their children receiving overall too many shots; vaccines causing fevers; and vaccines causing learning disabilities.⁸ Overall, over half of parents reported at least one concern about vaccines.⁸ A tool, the Parent Attitudes about Childhood Vaccines (PACV) survey, has been developed to identify hesitant parents. While further psychometric testing is needed, it has demonstrated content and face validity and was used in some of the studies cited in this review.^{5,9} Higher scores on the PACV have been associated with increased number of days underimmunized and for being behind schedule at nineteen months of age.¹⁰

Socioeconomic status: The stereotype of vaccine hesitant parents is of wealthy, highly educated individuals, yet this may not reflect the full spectrum of hesitancy, although these parents may feel the most empowered to act on or to vocalize their concerns. In one national survey, parents in the lowest income category reported 50% higher levels of agreement with concerns about serious vaccine side effects and lower perceived susceptibility to vaccine preventable disease.³ Nonetheless, a study in California found that higher median household income and higher percentage of White race in school communities significantly predicted higher percentages of students with personal belief exemptions from school-required immunizations, as well as greater increases in exemptions between 2007-2013.¹¹

Healthcare utilization: In a study of children enrolled in managed care organizations, undervaccinated children had fewer outpatient visits but more emergency room encounters.¹² In a study from Oregon, parents who exempted their children from school immunization requirements were more likely to have given birth outside of a hospital; to distrust local doctors; and to seek care from chiropractic providers for their youngest children.⁴

Homeschooling: In a survey of parents who homeschool their children, only 38% of reported fully immunizing their families, while 56% reported partial immunization and 6% said their children had received no vaccines.¹³ Although there was no comparison group in this survey, these high levels suggest that homeschooling parents may be especially likely to be vaccine hesitant.

What are the sources of vaccine-hesitancy?

Cultural shifts: Some researchers speculate that health promotion focusing on individual lifestyle choices and the growth of “consumerism” and patient involvement in decision-making has contributed to the rise of vaccine hesitancy.² Others cite the rise of social media and the internet as rich sources of not just





information but misinformation. Indeed, in one survey the number of parents reporting that the internet was one of their top three sources of information about immunization rose from 10% in 2009 to 24% in 2010.⁸

In an in-depth sociological study of parents in Colorado who refuse vaccines or choose alternative vaccine schedules, Jennifer Reich proposes that resisting vaccines is aligned with a parenting style she calls “individualist parenting,” in which parents spend extraordinary time and energy seeking to optimize their own children’s health and development (based on their intuitive understanding) while ignoring community obligation or the impacts of vaccine choices on other community members.¹⁴ Nonetheless, it remains important to acknowledge that there are many reasons for vaccine hesitancy, and successful strategies are likely to have to be tailored to local and individual context.¹⁵

A qualitative study of hesitant mothers in Quebec, Canada found that they perceived vaccination to be unnatural or artificial, compared to their “pure” infants, and that they mistrusted public health authorities and relied heavily on complementary and alternative medicine. Mothers reported that trusted individuals, including partners, friends, and family members influenced their vaccination decisions both positively and negatively.¹⁶

Lack of Information: Parents, and even some healthcare providers, are not aware of the high quality of vaccine safety surveillance.²

Misperceptions: Humans tend to misperceive the risks attendant on inaction (such as not vaccinating) as being preferable to the risks of taking an action (such as vaccinating).³ Additionally, a dynamic referred to as the “availability heuristic” leads people to misconstrue things that they *hear* about frequently as things that *happen* frequently.¹⁷ So a parent may believe that because they have heard about adverse events following vaccination, they must be common. Cognitive biases are further discussed below. While it hasn’t been quantified, some evidence suggests that media may contribute to these misperceptions. One study focused on an alleged link between flu vaccines and death in Italy; while media coverage of the allegation was rampant, there was very little coverage when it was disproved.¹⁸ Flu vaccination rates decreased the following year.

The limits of information

Not just the facts: Public health practitioners and healthcare providers may be guilty of believing that if we provide the facts, parents will make the decision to immunize their children. Unfortunately, evidence suggests that this is not necessarily true. Firstly, information alone may not be sufficient to convince a parent to vaccinate. “The facts” may not change a parent’s fundamental beliefs about health and illness.² Other factors that impact decision-making include fear and “bandwagoning,” or conforming to the





perceived social norm.¹⁷ One study found that even when education successfully reduced misperceptions of vaccines, it still did not impact intent to vaccinate – and when paired with images of sick children, could even increase erroneous beliefs in vaccine side effects.¹⁹

Cognitive biases: Part of this may be because of cognitive biases, types of errors in judgment that occur based on how people process and interpret information. Hagood and Herlihy highlight three that may have particular relevance to parents’ immunization decision-making:

- confirmation bias: the tendency to notice or recall information that confirms pre-existing beliefs
- illusory correlation: the belief that two variables are related when no such relationship exists
- the power of vivid cases: emotional and dramatic cases are remembered better and given more weight than statistics²⁰

Risk perception is also particularly vulnerable to errors in judgment; lay people’s risk perception is based more on past experiences than on abstract scientific information.² Others have pointed out that vaccine-hesitant parents exist across a “spectrum of cognitive decision-making styles” and suggest that communications be tailored by understanding the preferences of the parents in question.¹⁷ One study, based on the premise that cognitive bias makes it easier to create a new belief than to change an existing belief, found that providing information about the dangers of vaccine-preventable disease was more effective in improving attitudes towards vaccines than correcting misinformation.²¹

Intuitiveness: One review of cognitive obstacles to pro-vaccination beliefs identified several ways in which anti-vaccine beliefs are more intuitive than pro-vaccine beliefs and therefore spread more easily.²² For example, “disgust psychology” makes people easily fear vaccine ingredients. Further, distrust of institutions involved in creating and administering vaccines, such as pharmaceutical companies and governments makes it difficult to overcome the intuitiveness of anti-vaccination beliefs. The authors warn that forceful measures, such as more stringent immunization requirements, may backfire by increasing this distrust. The solution the authors propose is lengthy, in-person discussions with trusted sources.

Insufficient and unnecessary? Additionally, many parents without extensive knowledge do choose to immunize their children; they may even have less self-rated knowledge of vaccines and vaccine-preventable diseases than parents who don’t immunize.² In one study, neither parent nor adolescent knowledge about HPV disease or the HPV vaccine (measured at multiple time points) was associated in any way with the adolescents’ HPV immunization status.²³ In these cases, parents’ decision-making may be based on “conformity,” or adherence to a perceived social norm of immunizing.²

Overall, evidence suggests that the “knowledge deficit model of communication”² will not be adequate to effectively convince hesitant parents to vaccinate on time.²⁴





Social norms and networks

There is strong evidence that social networks impact parents' immunization decisions. In a national survey, 46% of parents listed family members as one of their top three sources of information about immunization, and 22% listed friends.⁸ In a social network analysis of parents in King County, Washington, the percent of parents' social networks that recommended against the standard immunization schedule was the single most predictive variable for their immunization decisions.²⁵ And in a survey of parents in Oregon who exempted their children from school immunization requirements, those in areas with high exemption rates were less likely than those in medium-rate areas to have strong vaccine concerns, suggesting a possible impact of perceived norms.⁴

Role of Providers

Impact of providers: Evidence that providers are uniquely effective at impacting parents' immunization decisions continues to grow. Receiving a recommendation from a healthcare provider is one of the main predictors of immunization status.² Parents who were hesitant to immunize but changed their minds cited information from a healthcare provider as the main reason they chose to immunize.²⁶ Parents who receive immunization information from their doctor are less likely to have concerns about vaccines than parents who get information from friends, family members, or books, and are 80% less likely to follow an alternative immunization schedule.²⁷

Parents trust providers: In one nationally representative survey, parents reported trusting their children's provider the most for vaccine safety information (76%), followed by other healthcare providers (26%), government experts (23%), and family and friends (15%).²⁸ In another, 85% of parents reported healthcare providers as one of their three most important sources of information about childhood vaccination.⁸ Interestingly, 90% of parents who fully vaccinated and 88% of those who didn't fully vaccinate listed a healthcare provider as one of their top 5 sources of information.²⁵ However, one study suggests that while parents who refuse or delay vaccines may trust their pediatrician on other issues, they don't trust them to provide "balanced" information on immunization.²⁹ Although overall the majority of parents trust immunization information from their providers, it may be possible that some hesitant parents are less likely to do so.

Communication: The way that providers communicate about immunizations may play a significant role in parents' decisions,³ but research is only beginning to explore this in detail. Making a strong and persistent recommendation may lead more parents to immunize their children. Opel et al. found that opening the conversation about immunizations with a presumptive approach rather than a participatory approach (for example, "we have to do some shots" rather than "what do you want to do about shots?") led to dramatically decreased resistance to vaccine recommendations: 83% of parents resisted recommendations with a participatory approach versus only 26% with a presumptive approach. This was true of vaccine-





hesitant parents as well as the study population as a whole.³⁰ Among parents who initially resisted following immunization recommendations, 47% accepted them when providers continued pursuing their recommendations. Encouraging providers to pursue their recommendations for immunization even when parents initially resist may be effective in increasing the number of children being vaccinated on schedule. However, it's unknown whether this impacts parental beliefs that underlie vaccine hesitancy, or only behaviors. Unintended consequences may include a decrease in parent satisfaction or trust in their provider.

It is possible that more forceful communication may alienate some hesitant parents. One study of parents seeking care for their children in a naturopathic clinic found that "feeling pressured" to immunize was a determinant of immunizing only partially or not at all.² Some suggest that listening and dialogue are more effective than pressure.³¹ Leask et al. suggest tailored encounters with members of five parental groups they identify as unquestioning acceptors, cautious acceptors, hesitant, late or selective vaccinators, and refusers.³² They recommend "guiding" parents, as opposed to "directing" them, with a goal of helping them make a quality decision and obtaining valid consent to immunize.

Provider attitudes: Although most providers fully support the recommended immunization schedule, it may be wrong to assume that all providers do. Younger providers in particular may be more sympathetic to hesitant parents. A recent study found that more recent health care provider graduates had 15% decreased odds of believing that many childhood vaccines were safe, and 3.7% of them believed that immunizations do more harm than good.³³ Another survey of pediatricians attending American Academy of Pediatrics-sponsored vaccine conferences found that 9% were concerned that the recommended immunization schedule may overwhelm the immune system.³⁴

Provider hesitancy may also be associated with their patients' (and patients' parents') beliefs. Parents whose providers believed that children get more immunizations than are good for them were 4.6 times more likely to agree with that statement, compared to parents whose providers did not.³⁵ However, it is unknown to what extent providers impact parents' beliefs and to what extent parents seek providers whose beliefs reflect their own.

Alternative immunization schedules: How do providers respond when hesitant parents choose to delay or "space out" recommended immunizations? In a national sample, 64% of pediatricians and family medicine physicians agreed to spread out vaccines at least some of the time.³⁶ In a survey of primary care pediatricians practicing in Washington state, 77% of respondents reported that parents sometimes or frequently requested alternative immunization schedules, and 61% were comfortable using an alternative schedule if requested by a parent.³⁷ In a sample of King County parents, 9.4% planned to use an alternative immunization schedule.³⁸





It is worth noting that providers do not always have an accurate perception of how the families they work with perceive immunizations. In one study done in a multiracial sample of parents and their providers in Texas, providers underestimated the importance of immunization to parents (especially for influenza and HPV vaccination).³⁹ Finally, there is some evidence that addressing vaccine hesitancy impacts providers' job satisfaction; in one survey, 46% of pediatricians found their job less satisfying because of parents' concerns.³⁶

Interventions

Tested interventions: Several studies have evaluated the impact of interventions on vaccine hesitancy. One randomized controlled trial compared vaccine hesitant parents receiving "usual care" with an intervention group that viewed a video and received written information. Those in the intervention group had a median decrease of 6.7 points on the PACV, but there was no significant difference in the on-time receipt of vaccines.⁴⁰ Another study provided print educational materials to mothers at a prenatal visit, one week postpartum, or two months postpartum. Mothers who received information at any of these times were more likely to support immunization compared with mothers who did not receive the information. Although there was no significant difference in attitudes towards vaccines, mothers indicated that they preferred to get the information before the first vaccination visit.⁴¹ A campaign based on values; shared identity; social norms; and stories (rather than facts) had a positive impact on vaccine attitudes in 77% of parents, including one third of those who had refused or questioned vaccines.⁴²

Policy interventions may have an impact on state immunization rates. Although they are difficult to study, policy interventions may impact parental immunization choices – if not their underlying hesitancy. One study found that having a philosophical exemption and having an easy exemption process are both correlated with 2.3-2.5 times the exemption rates of states without philosophical exemptions or with more difficult processes.⁴³

A systematic review found that educational interventions, especially pamphlets, were the most frequently tested; half of those reviewed (five out of ten) reported a significant positive impact on parents' intent to immunize.⁴⁴ However, most of the studies were observational, and the authors call for studies that test a wider variety of communication methods, that include cost-effectiveness analyses, and that measure direct outcomes (such as immunization status) in a rigorous methodology. Additionally, a recent Cochrane review of face-to-face interventions addressing vaccine hesitancy found the studies to be overall of low quality and lacking in impact.⁴⁵

The need: Although research in this area is growing, there is still a strong need for a robust body of evidence – including randomized controlled trials - on what works to address vaccine hesitancy.⁴⁴ A recent review of published reviews did not find adequate evidence to recommend any intervention.⁴⁶ Some researchers suggest that diving deeper into more tailored ways to engage with what motivates parents'





decision-making, such as through motivational interviewing, is ripe for exploration.^{17,20} One challenge to identifying effective interventions is that it may that changes on multiple levels, from providers to health systems to national policies, are needed to effectively address vaccine hesitancy.⁴⁷

Conclusion

Research published in recent years continues to support both the premise and strategy of Vax Northwest's work to date: trust-building communication with healthcare providers and positive social norms in community settings, paired with rigorous evaluation. Nonetheless, a plethora of questions remain: What are the most effective ways for providers to communicate with hesitant parents? How can educational materials or programs do more than provide facts, but connect with the values that drive parents' decision-making? Is there a way to address the root causes of vaccine hesitancy? Given the diversity of hesitant parents, including a wide variety of cultural beliefs and concerns about immunization, it's possible that such a complex issue will only be successfully addressed by a multilevel combination of interventions.

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